CONSISTENT EVALUATION PROTOCOL (CEP)

CPUC Energy Storage Workshop

July 28, 2015

CEP Overview

- **The CEP is used to report solicitation results to the Commission in a standardized format.**
- **Utility-specific evaluations are re-run for shortlisted offers:**
  - Using same costs and operating characteristics from offers;
  - Replacing market prices with standardized, public data; and
  - Ignoring non-quantifiable adjustments like project viability and project diversity, and utility-specific adjustments like location.
- **The CEP includes descriptive, quantitative, and qualitative information on offers.**

CEP Contents

- **Descriptive information** comes directly from the offers.
- **Quantitative information** includes a calculation of net market value based on public inputs.
- **Qualitative information** includes an indication of the primary and secondary end uses for each offer.

CEP Publicly Available Data Inputs

- **The standardized, publicly available data**–to be used in re-running the utility-specific net market value calculations–will come from the most recent avoided cost calculator used in a Commission proceeding*.

- **The public inputs include:**

  Forecast hourly energy prices
  Forecast capacity prices
  Forecast ancillary services value
  Forecast monthly gas prices
  Discount rate
  System loss factors
  Forecast GHG costs

- **Public data will be refreshed Fall 2016 for 2nd RFO**

* The most recent such avoided cost calculator is "DERAvoidedCostModel_v3.9_2011 v4d.xlsm" and is available on E3's website at http://www.ethree.com/public_projects/cpuc5.php

CEP Descriptive Information

- **Descriptive information comes directly from the offer and includes the following items.**

• Utility (PG&E/SCE/SDG&E) • Name of Project	• Commercial Operation Date • Term (Years)	• Self-Discharge (MW/hour) • Ramp Rate (MW/hour)
• Interconnection Voltage (kV) • Interconnection Level (T/D)	• Maximum Capacity (MW) • Minimum Capacity (MW)	• AGC (Yes/No) • Regulation at Zero (Yes/No)
• Local Capacity Area • Zone (NP/ZP/SP)	• Qualifying RA Capacity (MW) • Duration (Hours)	• Contract Cost ($) • Variable O&M ($/MWh)
• Status (New/Existing) • Product (Dispatchable/RA)	• Efficiency (%) • Max Daily Switches (#/day)	• Fixed O&M ($/kW-year)
• Storage Technology	• Max Cycles per Lifetime (#)	

CEP Quantitative Information

- **The Net Market Value calculation—benefits minus costs—is done with utility-specific models using publicly available prices. The market benefits and costs are as follows.**

Market Benefits	Market Costs
• Capacity/Resource Adequacy Value • Energy Value	• Fixed Capacity Payments and Fixed O&M Cost* • Charging Costs and Variable O&M Cost
• Ancillary Services Value • Distribution Investment Deferral Value	• Network Upgrade Cost • GHG Compliance Cost (if applicable to project)
	• Debt Equivalency Cost • Market Participation Cost

*Includes developers' costs such as permitting, construction, decommissioning, etc.

GHG Impacts Captured in NMV

- **Energy prices include GHG cost**
  - Effectively adder to gas cost
    - 2015 actual $12/t ~ $0.75/MMBtu
    - 2020 forecast $40/t ~ $2.10/MMBtu
  - Higher $/MWh GHG cost on-peak because less efficient plants
  - GHG impacts incorporated when modeling energy cycling
  - If storage project is “making money” doing energy shifting, it is also reducing GHGs.

- **Ancillary Services prices also incorporate GHG cost**
  - Based on opportunity cost of not generating

CEP Qualitative Information

Qualitative information consists of an indication of which end uses might exist for an offer:

→ “2” = primary function; “1” = secondary function; and “0” = function not present

1. Ancillary services: frequency regulation	8. Intermittent resource integration: wind (ramp / voltage support)	15. Distribution peak capacity support (upgrade deferral)
2. Ancillary services: spin / non-spin / replacement reserves	9. Intermittent resource integration: photovoltaic (time shift, voltage sag, rapid demand support)	16. Distribution operation (voltage / value at risk (VAR) support)
3. Ancillary services: ramp	10. Supply firming	17. Outage mitigation: micro-grid
4. Black start	11. Peak shaving	18. Time-of-use (TOU) energy cost management
5. Real-time energy balancing	12. Transmission peak capacity support (upgrade deferral)	19. Power quality
6. Energy price arbitrage	13. Transmission operation (short duration performance, inertia, system reliability)	20. Back-up power
7. Resource adequacy	14. Transmission congestion relief	